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Mouth Infection As It Affects The General Dental Practitioner

A Prize Essay Presented to the Canadian
Dental Association, Montreal

By M. H. GARVIN, D. D. S.
Winnipeg, Canada

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The Canadian Oral Prophylactic Association

IN the year 1905, a committee of dentists of Toronto was formed to communicate with the manufacturers of the tooth preparations then on the market to ascertain the composition of each, because they believed that a dentist should not recommend any preparation of which he did not know the ingredients.

Finding there was no satisfaction to be obtained in this direction as to the formulæ of these preparations, arrangements were made to have them chemically analyzed, thus ascertaining that in most of the samples were ingredients which should not exist in an ideal mouth preparation.

The Canadian Oral Prophylactic Association was then organized to have manufactured preparations which should contain nothing which was not beneficial.

After much consideration and consultation a paste was manufactured under the registered name "Hutax" (meaning mouth health). Later a powder was placed on the market, and last a tooth brush.

These articles are the result of frequent consultations with many of the leading practitioners, not only in Toronto, but of the Dominion of Canada and the United States.

The shareholders of the Canadian Oral Prophylactic Association originally subscribed \$5.00 each for "the good of the cause," and the charter of incorporation provides that the profits are to be expended for educational and philanthropic purposes, such as (a) bringing prominently before the public important information, which the dentist has, as to the influence of conditions of the mouth on the general health; (b) care of the teeth of the poor; (c) assisting the indigent in the profession of dentistry. Thus no director or shareholder receives directly or indirectly any dividends or other remuneration.

Every dentist may recommend "Hutax" preparations with a confident consciousness that there is nothing better on the market, and that the profits will be utilized for the good of the profession and of humanity.

Mouth Infection as it Affects the General Dental Practitioner

By M. H. Garvin, D.D.S., Winnipeg, Canada.

The men of to-day in the dental profession who really think, believe that in future, they, as the guardians of the health of the human mouth, must play a larger role in solving community problems. They must have a larger and broader vision of what the public have a right to expect of them.

This means, for the dental student, a higher preliminary qualification. It means that there must be a closer association between medical and dental students during their college course, and later in the pursuit of their professions. The dentist must have a broader knowledge of general pathology, bacteriology and allied subjects in order to even comprehend the possibilities of his work.

The average practitioner, even though he is only a casual observer, will be impressed with the importance of the following statement: "The biggest problem in dentistry to-day is the root canal problem." He will be informed that to use arsenic and irritating drugs, such as formalin, in a tooth, is an unpardonable crime. Also, that in treating a tooth it is necessary to secure a roentgenogram before beginning, when half finished and when operation is completed, in fact that all treated teeth should be radiographed. Again he will be told, that from forty to eighty, yes, even ninety per cent. of all treated teeth show signs of apical infection after a lapse of say one year or longer, and he might even infer that the remainder would show an infected area if the roentgenogram were taken from a different angle, or that even if it didn't show in pictures taken from several angles, that a granuloma might be there of such density as to be indistinguishable in the roentgenogram. Among other things he will be told, that there are fewer alveolar abscesses in the poorer classes than in the middle and wealthy classes; that only ten per cent. of all dentists are capable of treating root canals, and that only ten per cent. of the people can afford this specialized treatment; that if a root canal is not filled to the apex or cannot be so filled, the tooth should be extracted at once. Further, he will hear it stated, that if the root filling does not pass through the apex of the root encapsulating it, that focal infection will result; that regeneration of the tissue beyond the

apex never occurs where the root canal filling does not pass through the apex. On the other hand, he will be told that to force a material through the apex that is subject to variation in size due to powers of expansion or contraction, or to use a solution that becomes somewhat porous when the solvent disappears merely courts disaster.

Then we have the problems associated with pyorrhea as to its being caused by or causing alveolar abscesses at the apices of teeth, to say nothing of the more common and accepted theories as to its cause and effect.

Above all these theories in importance, is the one so cleverly and so beautifully worked out by Dr. E. C. Rosenow of the Mayo Clinic, that a local focus of infection at any point in the body may cause a lesion in some other part of the body, dependent in part upon the elective localization of bacteria.

Portentous problems confront us and we realize how essential it is to solve them. The writer has personally heard one of the greatest living medical authorities on infection state the following before a group of medical men: "You know the dentist just takes a little cotton, wraps it on a broach with his fingers, and shoves it down the root canal. He doesn't know any better." However, such statements in light of the evidence at hand are not to be wondered at. On the other hand the writer would unhesitatingly condemn the spirit shown by many men in our own dental profession, who, having attained a little knowledge "which has made them mad," will talk in public of the culpability of our brother dentists for not treating a root canal in the way they think it should be treated, in tearing off beautiful bridgework in the mouth of a confrere's patient because, according to the roentgenogram taken by them, the root canal did not appear to be filled quite to the apex or perchance through the apex, without the slightest effort being made to protect the brother practitioner. With such seeds being sown broadcast to-day, many will certainly fall in fertile soil rather than by the wayside, and will surely bring forth fruit—a harvest of doubt and suspicion of our methods as dentists in the minds of the public generally. If it is necessary to use these methods in order to elevate the dental profession, it is most unfortunate. We believe that the same ends could be obtained in a far nobler way and with much less injury to the dignity and standards of our profession.

Hearing their controversies, some of which have been hinted at in the preceding paragraph, and realizing the seri-

ousness of the situation, particularly from the viewpoint of the general practitioner in dentistry, the work outlined in this paper was undertaken. As the radiographic work was done between April 1st and June 10th, 1916, and the root resection work was done between December 1st, 1915 and June 10th, 1916, the conclusions are not based upon as many cases as might be desired.

The radiographic work was undertaken with this thought in mind, that every patient coming to the office should have briefly explained to them the theory of focal infection, and be advised to submit to a radiographic examination, which involved the testing of all teeth as to vitality and the radiographing of all non-vital teeth. In following this plan we were impressed with these facts:

1. That statistics taken in a hospital would differ materially from those compiled in a dental office.
2. That statistics taken in the office of a specialist who sees a large number of referred cases having already constitutional disorders, would differ from those compiled in the average dental office.
3. That in the average dental office at the present time, it is difficult to get all healthy patients to submit to such an examination, and in our case a small percentage of healthy people refused. It was an easy matter to convince those who had any suggestion of a systemic disorder.
4. That the percentage of apical infection existing in ordinarily healthy individuals is much less than has been generally quoted, although serious enough to demand most careful consideration.

In 355 teeth radiographed, we could find no apical involvement in 246 cases or 69.2 per cent., 22 cases or 6 per cent. were doubtful, and 87 cases or 24.5 per cent. showed definite rarefied areas. None of these 355 cases had fistulas or any definite indication that infection did or did not exist at the apices; 14 per cent. of these 355 teeth had the canals filled practically to the apex, and of these 28 per cent. showed abnormal apical conditions.

Of these 355 cases we had history records of 110. All of the 110 cases were treated longer than one year previous to being radiographed, and from that up to twelve years. We could find no rarefied areas at the apices of 90 of these cases, or 81.8 per cent. Seven cases were doubtful and 13 showed

definite areas, or 20 cases in all, being 18.1 per cent. Of the 90 cases marked O.K. two had had dead pulps, 53 were devitalized with arsenic, 24 were devitalized with cocaine, and the pulps were removed from eleven cases by conductive anaesthesia.

From an analysis of the 20 cases marked infected or questionable the following facts were obvious. One was a lower molar devitalized with arsenic twelve years ago, the roots filled, and the cavity filled with amalgam. Six had had dead pulps to begin with. Thirteen, with one exception, were in the mouths of patients suffering from a severe type of pyorrhea. Five of these thirteen cases had shell crowns on, and the roots devitalized with arsenic. Six had dowel crowns, four of the roots being devitalized with arsenic and two with cocaine. Two had inlays, with a post running into the root, being part of a pyorrhea splint, one root being devitalized with arsenic and one with cocaine.

We are impressed with the fact, that in this group of 110 cases, only one tooth that had been filled with an ordinary filling over the root filling showed visible signs of infection. As this filling had been repaired from time to time during the twelve years of its existence, it is quite possible that infection had gained entrance through a later cavity some years after the original root filling was inserted.

We further note that over half of these teeth were devitalized with arsenic, and conclude, that with proper technique, the use of arsenic in devitalization is not an important factor in the production of apical infection. At least we can go this far at present and state that we have been unable to detect any clinical evidence from the human mouth that would justify us in shelving this drug which has served us in the past, is still serving us to some extent, and may be of service in the future.

Further, most of these roots were filled with an antiseptic paste containing formalin, which paste would harden very soon, with a tendency to dry and harden any organic matter in the tubules of the dentine. In many of the larger roots a gutta percha cone was forced down into the paste. These roots were filled with the paste as near to the apex as possible, but not through the apex if it could be avoided. In a great many cases the gutta percha cone, when used, did not reach more than three-quarters of the way down the root canal. We endeavored to place these canals in such shape that nature could make the necessary repair. We believe that nature's repair of the apical tissues in a treated tooth is much prefer-

able to any mechanical repair on our part. We believe that it is not entirely a mechanical problem, but rather a physiological problem. We believe that it is practically impossible for the average dentist to absolutely fill even a majority of root canals from a mechanical standpoint.

The use of formalin has been greatly condemned in root canal work, particularly in root canal fillings. In our work thus far we have found nothing to justify this condemnation. We find no evidence of soreness of the pericementum in practically every case, as against considerable soreness in the use of substances like chloroform and resin preparations. The formalin, outside of its antiseptic qualities, seems to have a stimulating effect on the surrounding tissue which lends itself to repair by nature's processes.

We admit, that to use this drug in such strength as to destroy or greatly weaken the tissues at the apex, or beyond the apex, would be disastrous, but we believe that a milder solution acts beneficially, and that it stimulates the surrounding tissues to bony repair, walling off the dentine, which, in a treated state, is not a condition to be desired even at best.

In treating these teeth we tried to perform a clean operation. We endeavored to keep the saliva out of the canal at all times. We sterilized all instruments used in the operation. We washed our hands before wrapping cotton on the broaches, and insisted on the assistant doing so. Then we relied on the antiseptic nature of our root filling counteracting any bacteria which might have gained entrance, through the fact, that our cotton, after being wrapped on a broach, was necessarily not aseptic. In other words we tried to do a clean operation, not an aseptic one, and we are not yet convinced that we failed in bringing about a satisfactory condition. We submit that for those who believe in a neutral aseptic root filling, there is only one course open, that is, to perform an aseptic operation, perfect in every detail. Unless it can be proven that an antiseptic root filling is objectionable, it would seem that a clean operation would meet the requirements, and if so it will mean much to the average dentist, and mean much to the public from a financial standpoint.

Out of eight dead pulps only two apparently recovered. Six did not. In the treatment of these conditions ionization was not attempted, so we cannot pass judgment on its efficacy, but we believe that teeth with dead pulps or badly infected pulps should be at once extracted, unless the operator is prepared to take exceptional precautions and be prepared to

radiograph the case frequently, with an effort to prove or disprove the efficacy of his treatment. In cases of systemic involvement this chance should not be taken, but the tooth should be extracted.

In the thirteen cases referred to we do not consider it a significant fact that a large majority of these teeth were devitalized with arsenic, for the reason that these patients were pyorrhea cases with particularly sensitive teeth, and it had been our practice, at that time to use arsenic almost exclusively in the pulp treatment of this type of case. The shell crowns, five in number, may have played some part in causing inflammatory and infective conditions at the gingival margin, and in any case should hereafter be condemned in most cases, as the cast jacket crown is evidently so superior. The dowel crowns, six in number, may have played some part in bringing about disaster, either through infection permeating the cement substance, or probably due to infection getting in to the canal and permeating the root filling during the fitting or cementing of the crown, the same applying to the other two cases which were inlay abutments. We believe that in these thirteen cases the chief factor was the pyorrhea condition which existed previous to the treatment of the teeth referred to. We cannot say just what part alveolar abscesses, which may have existed at the apices of other treated teeth in the same mouth previous to commencing our treatment, may have had to do with causing the pyorrhea condition in these patients. We believe that a more careful and intelligent diagnosis of pyorrhea cases, always with the aid of the X-ray, will eliminate much of the trouble found in this class.

In treating the rarefied area at the apices, we extracted the teeth and curetted the abscessed area in cases where the involvement was very extensive, or where, on account of systemic conditions, a more conservative treatment was contraindicated. We also extracted in cases where there was a direct connection to the mouth from one of these areas through a pyorrhea pocket, believing that such cases are incurable even though the tooth is not loose at the time. In a few cases the roots were retreated and refilled with an antiseptic root filling, but in most cases root tip resection was resorted to, the area thoroughly curetted and an amalgam filling inserted in the apical end of the root canal. Silver amalgam was used for this purpose, and was packed tightly into the cavity, not only to seal the canal, but to avoid the exposure of a large area of devitalized dentine. In most cases

the roots were retreated and refilled before performing the resection, but in some cases this was not done where it meant removing a bridge. In these cases we relied on the amalgam filling to wall off the infection, but to date insufficient time has elapsed to pass judgment on this technique. We have resected the root tips of 112 teeth in 83 patients. Ninety-five of these teeth had an amalgam filling inserted in the apex and seventeen had not.

Recently, from 15 of these root resections, we took cultures planting some directly in blood agar, and some in bouillon, and from the bouillon after twenty-four hours' growth, transplanted to blood agar with the following result:

Streptococcus	three cases
Streptococcus and staphylococcus	one case
Streptococcus and bacillus	one case
Staphylococcus	four cases
Diplococcus	one case
Bacillus	two cases
No growth	seven cases

This part of the work has not been carried far enough to draw any conclusions. In cases where we obtained no growth we have to remember that many forms of bacteria will not grow in any ordinary artificial media. Then it is quite possible, that in these cases, the culture was obtained from the centre of an area where it might be sterile, while a marked growth might have resulted if the culture had been obtained from the margins of the area. We did not find the streptococcus in a majority of these cases, but that does not mean they were not there, but that they did not grow, or were grown out, in the culture media. Much importance, and obviously not too much, has been placed upon the presence of the streptococcus in these cases and its relation to endocarditis, arthritis and similar conditions. We believe also that a further study should be made of the presence of other forms of bacteria and their relation to systemic disorders, as, for instance, the staphylococcus in certain skin eruptions. We have had one case of this type clear up after the extraction of one tooth, and the root tip resection of two teeth. We have had several cases of arthritis clear up entirely, after similar treatment, also two cases of heart lesion greatly improve.



Card 1 shows a series of examples of rarefaction and infection at the apices of non-vital teeth. No fistula existed in any case except A, and then was only discovered in this case after the roentgenogram was taken, it being very obscure. None of these conditions were causing any pain, and their existence was unknown to the patient. B.—abscess under first molar. C.—abscesses over central and lateral. D.—abscess over second bicuspid with dead pulp, in boy twelve years old. E.—abscess over first bicuspid. F.—abscess over lateral with dead pulp. G.—abscesses over central, lateral and bicuspid. H. and J. from same patient with all incisors involved. K.—abscess under second molar, and abscess under root, mesial to it. With such a large series of such cases as these presenting themselves constantly, and as we know of no other way to locate them other than with the X-ray, we believe that the general practice of radiographing or having radiographed every non-vital tooth in every patient's mouth should be adopted, without delay, by every dentist who is endeavoring to give his patients the most efficient service of which he is capable.



CARD II

Card 2 shows a series of cases before and after operation, where the root canals have been retreated and refilled and root resection performed, and with amalgam placed in the apices. B. shows both roots of the upper first bicuspid filled with amalgam. E. is interesting on account of the fact that this patient suffered for years from arthritis, and we hope for improvement now that this infected area has been removed. F. after operation. J. shows placing of amalgam in lower central, after dead pulp shown in I. has been treated. C., G., K. shows cases before operation, and D., H., L. after operation.



CARD III

Card 3 shows a series of cases before and after operation, where the root canals have not been retreated before performing root resection. In these cases we hope to have walled off infection by our amalgam filling, tightly packed into the canal. B. is a lower second bicuspid. D. shows the upper incisors. F. upper central and lateral. H. upper bicuspid. J. upper central and lateral. L. upper bicuspid. We can not say at the present time whether or not this procedure is justifiable.



CARD IV

Card 4. Roentgenograms A.-F. inclusive, show extensive trouble in the mouth of a single patient. Roentgenograms G.-K. show extensive trouble in the mouth of another patient.

Neither patient was aware of the existence of these conditions. In the case of the first patient, A. shows abscesses over left lateral and central and B. the treatment. C. shows abscesses over right lateral and central and D. the treatment. E. shows abscesses over upper second molar with dead pulp, and over buccal root of third molar, both of which teeth were extracted. F. shows abscess over upper second bicuspid which had been treated and presence of third molar root, both of which were extracted. In the case of the second patient, G. shows abscess over right lateral, and H. the treatment. I. shows extensive abscesses over lateral and cuspid, and J. the treatment. K. shows a very extensive area under lower second bicuspid and first molar, also abscess under second molar root, all of which were extracted and the area curetted. These teeth were not at all loose, but a fistula was finally discovered on the lingual aspect, well down in the floor of the mouth. From the history, we learn that these teeth were treated for dead pulps three years previously and have given no pain since.



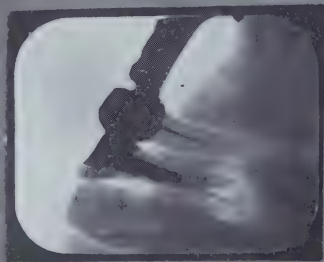
CARD V

Card 5. A. and B. show upper lateral, before, and three months after treatment. This patient was a young woman about twenty-five years of age and healthy. She presented herself for treatment, complaining of a soft spot in palate which sometimes swelled up, and then would subside, with no particular pain. The roentgenogram showed an abscess over the lateral tooth. The root canal of this tooth was retreated and refilled, using an antiseptic root filling with formalin as one of the ingredients. All local symptoms disappeared. B. was taken three months after completing operation, and shows the abscess cavity well filled in, and, we believe, with bone. We believe this type of treatment is indicated in young patients who are robust, and where there are no systemic involvements. It would also be necessary to radiograph these cases from time to time to make sure of the result. C. shows an abscess at the apex of both roots of a lower left first molar, in man 38 years old. The tooth has been treated but the roots not filled. There was a slight swelling in the gum but no pain and no fistula. D. shows the roots refilled and the resection performed. We were unable to use amalgam in this case. E. shows the case three and one-half months after operation, with considerable bony regeneration. F. shows upper central after operation, in woman 35 years of age. G. shows the same case four months after operation, with almost complete regeneration of bone. H. shows regeneration of bone over central root five months after operation. A picture of this case immediately following the operation was not taken.

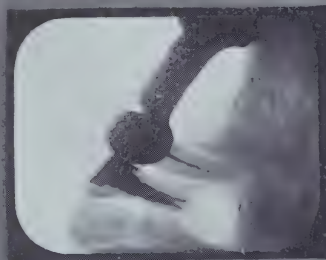


CARD VI

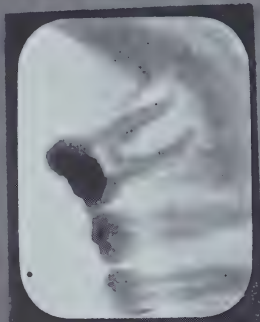
Card 6. A. shows abscessed area with direct connection to gingival margin, and was extracted, although not at all loose. To attempt resection of this type of case is useless, as one meets with slight success. B. shows abscess at apex of lower central, the tooth being retained by a pyorrhea splint. D. shows the difficulty of keeping the amalgam in the cavity where it belongs, but we do not believe this condition will interfere with the regeneration of the bony structure. E. shows a very extensive infected area of a granuloma type, and difficult to diagnose. F. shows condition after operation, and G. the condition seven weeks later. This case is doubtful on account of the small amount of process existing between the central and lateral.



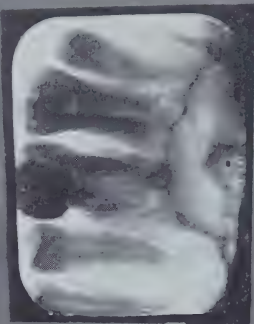
A 241



B 241C



C 214 B



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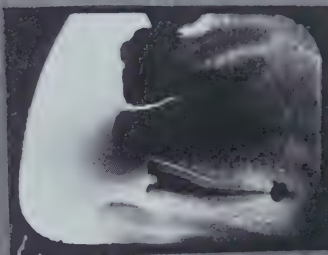
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H 324

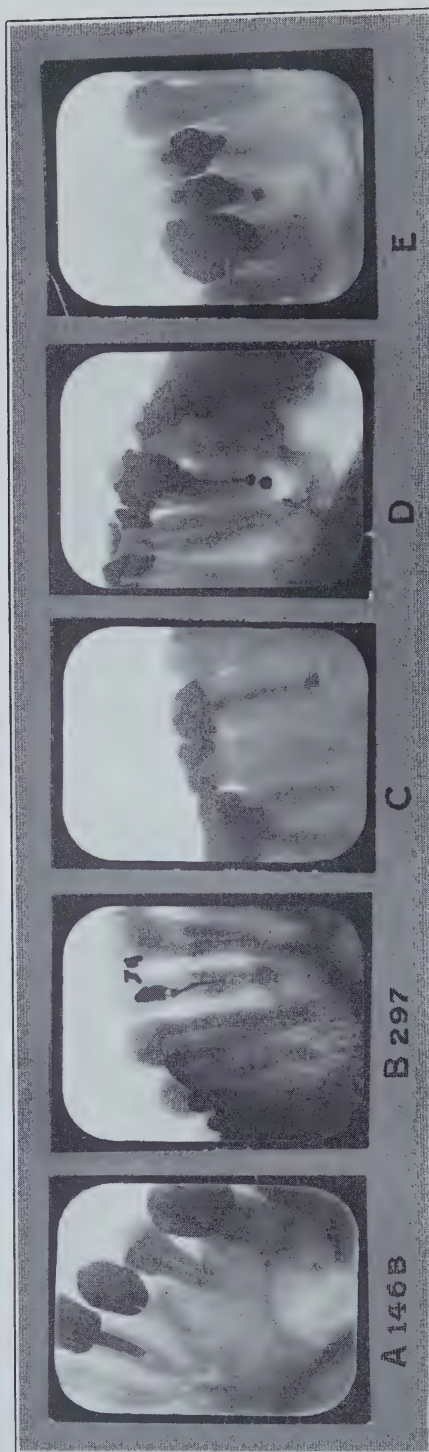


G 207A

CARD VII

Card 7. A. shows root filling passing through side of root into abscess, and B. same case after operation. No amalgam was used in this case, but we have concluded since, that it should have been used. C. shows large involvement around lower molar. This patient was a nurse twenty-five years of age, and had been suffering from inflammatory rheumatism for several weeks. As the case was not clearing up the physician sent her to us for a mouth examination. We discovered the large abscess shown in C., and the smaller one over the first molar in D. These teeth were removed, and the patient recovered almost at once, and has had no recurrence in two months. E. shows loss of bony structure and infection in pyorrhea case.

An attempt was made to treat molar shown in F. without radiographing. This picture shows measurement wires in position. At this stage in the treatment an acute condition started, the tooth was radiographed and then extracted. G. shows a root filling forced through the apical foramen of a tooth. H. shows definite involvement under both molars. These teeth were treated for dead pulps five years ago, and have given no pain since. We believe that while these areas may be sterile that the chances are they are infected, or may become so at any time, and that these teeth should be extracted. In this case the patient would not consent to the radical operation.



CARD VIII

Card 8. A. shows a very small area over the cuspid which had never given the slightest pain. In performing this resection we took a culture and obtained a pure streptococcus, showing no matter how small the area it must not be overlooked.

B. shows a lateral root apparently half filled. This root was treated eight years ago, and we believe that nature has walled in this dentine and filling so that it is far from probable that any infection will ever develop at the apex on account of this tooth having been treated. A slight exostosis is noticeable, and is usually noticeable in these cases. There are such a large number of these cases that we are convinced that the question of focal infection does not depend on whether the canal is, from a mechanical standpoint, filled to the apex or through the apex. C. shows a lower left first bicuspid after resection, with amalgam filling in position. D., amalgam filling in both roots of an upper first bicuspid, and E., an upper second bicuspid.

Conclusions.

1. Every dentist should insist on radiographing or having radiographed all non-vital teeth in making his preliminary examination of the patient.

2. Under present conditions all teeth with dead pulps or badly infected pulps, should be extracted, unless the operator is prepared to take exceptional precaution and radiograph the case frequently, and only then where there is no systemic involvement. The root tip should be resected in all cases where any rarefied area exists and amalgam placed in apex.

3. In pyorrhea cases all treated teeth should be radiographed at intervals, the interval to be determined in each individual case.

4. Where a rarefied area exists at the apex of a tooth, the root canal may be retreated and radiographed again in three months, on condition that the patient is young and healthy. If the area is large or the patient is not young, the root tip should be resected and an amalgam filling placed in the apex. We have not come to a conclusion as to whether or not the root canal must be retreated in every case. It would certainly be preferable. In cases where there is any extensive systemic involvement the tooth should be extracted.

5. In root canal treatment the aim must be to so improve the condition that nature can make the repair.

6. That if a neutral aseptic root filling is used, an aseptic root canal operation must be performed. We can find nothing to condemn the use of an antiseptic root filling in which case a clean root canal operation, not necessarily aseptic may be sufficient.

7. We can find nothing to convince us, in the cases thus far examined that with proper technique, it is wrong to ever use arsenic in the treatment of teeth, or such drugs as formalin in weak solution in the treatment of root canals.

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Care of the Teeth. Dr. Grieve. 1909.

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The C.O.P.A.: Its History and Development (The Executive). 1912.

Teeth and Health. C. N. Johnson. 1912.

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The Announcement of the Offer of One Thousand Dollars to Encourage Original Research Work in Canada. 1915.

Skeleton Lectures and Lantern Slides for Public Addresses on

- (1) Tooth Decay, Cause and Prevention;
- (2) Irregularities of the Teeth;
- (3) The Teeth: Their Use and Abuse;
- (4) Outline of Lecture on Children's Teeth;
- (5) Mastication. Educational Committee. 1915.

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New Set of Public School Dental Educational Charts. Educational Committee. 1917.

Annual Report, including President's Address and Financial Statement for the Years 1907 to 1916.

Mouth Infection as it Affects the General Dental Practitioner. M. H. Garvin. 1917.

